

COMBINATION OF GOLF CLUB HEAD BODY AND STRIKING

PLATE

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a combination of a golf club head and a striking plate. In particular, the present invention relates to a combination of a golf club head and a striking plate in which the golf club head and the striking plate together provide a reliable engaging relationship therebetween to improve welding reliability and to simplify positioning for the assembling
10 procedure.

2. Description of Related Art

U.S. Patent No. 5,871,408 discloses a method for fusing a ball-striking plate with a golf club head case. A golf club head case of a metal material is prepared and includes a recess having a shoulder located in a
15 bottom of the recess. The shoulder of the recess of the golf club head case has a deformable protruded portion in an outer edge thereof for enhancing the fusion of the ball-striking plate with the recess of the golf club head case. A ball-striking plate of a metal material is prepared and received in the recess of the golf club head case, with the underside of the ball-striking plate abutting
20 against the protruded portion, thereby slightly deforming the protruded portion. A welding material is arranged on the shoulder of the recess of the golf club head case such that the underside of the ball-striking plate is in

contact with the welding material. The golf club head case containing the ball-striking plate is baked in an oven at a temperature higher than the melting point of the welding material but lower than those of the golf club head case and the ball-striking plate. The based case is removed from the oven.

5 However, a space delimited by the ball-striking plate, the shoulder, and the protruded portion receives a limited amount of welding material. Further, a portion of the welding material is used to fill slits between an inner perimeter delimiting the recess and an outer perimeter of the ball-striking plate such that the remaining amount of welding material becomes
10 insufficient. Voids are thus generated. As a result, the joining areas of brazing are apt to crack when the ball-striking plate hits a golf ball and thus deforms. Further, the gap between the striking plate and the inner perimeter of the golf club head case should be precisely controlled to assure filling of the brazing material into the gap regardless of the process for manufacturing
15 the golf club head case and the ball-striking plate. To achieve this, the golf club head case and the ball-striking plate must be milled by additional machines to control the gap tolerance. The overall time for manufacturing the golf club head is prolonged and the overall manufacturing cost is increased, which are detrimental to mass production.

20 Taiwan Patent Publication No. 469144 discloses an improved method of that disclosed in U.S. Patent No. 5,871,408. In the improved method, after the brazing procedure, an ordinary welding procedure such as Argon welding

is carried out along a joining gap between the ball-striking plate and the golf club head case. Then, grinding and polishing are carried out on the outer surfaces of the golf club head case. However, the tolerance between the golf club head case and the ball-striking plate still needs precise control. The
5 problem of generation of voids resulting from insufficient welding material, the problem of defective welding result, and the problem of long manufacturing time still exist.

OBJECTS OF THE INVENTION

An object of the present invention is to provide a combination of a
10 club head body and a striking plate, wherein positioning of the striking plate in the club head body in the subsequent welding process is simplified while providing improved welding effect, improved welding convenience, and improved bonding reliability.

SUMMARY OF THE INVENTION

15 In accordance with an aspect of the present invention, in a combination of a club head body and a striking plate, the club head body includes an opening in a front end thereof, a perimeter delimiting the opening forming an inner engaging face. The striking plate includes a front face for striking a golf ball, the striking plate including an outer perimeter that forms
20 an outer engaging face. The striking plate is received in the opening of the club head body. The inner engaging face and the outer engaging face together form a filler-receiving space for receiving a welding material. Further, the

inner engaging face and the outer engaging face together form an abutting section that reliably retains the striking plate in place for a subsequent welding process.

Other objects, advantages and novel features of this invention will
5 become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded perspective view of a first embodiment in accordance with the present invention;

10 Fig. 2 is an exploded sectional view of the first embodiment in accordance with the present invention;

Fig. 3 is a sectional view of the first embodiment in accordance with the present invention;

Fig. 4 is a sectional view of a second embodiment in accordance with
15 the present invention;

Fig. 5 is an exploded perspective view of a third embodiment in accordance with the present invention;

Fig. 6 is an exploded sectional view of the third embodiment in accordance with the present invention;

20 Fig. 7 is a sectional view of the third embodiment in accordance with the present invention;

Fig. 8 is an exploded perspective view of a fourth embodiment in

accordance with the present invention;

Fig. 9 is an exploded sectional view of the fourth embodiment in accordance with the present invention;

Fig. 10 is a sectional view of the fourth embodiment in accordance
5 with the present invention;

Fig. 11 is an exploded perspective view of a fifth embodiment in accordance with the present invention;

Fig. 12 is a sectional view of the fifth embodiment in accordance with the present invention;

Fig. 13 is an exploded perspective view of a sixth embodiment in
10 accordance with the present invention;

Fig. 14 is a sectional view of the sixth embodiment in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

15 Preferred embodiments of the present invention are now to be described hereinafter in detail.

Referring to Figs. 1 through 3, a first embodiment in accordance with the present invention includes a club head body 10 and a striking plate 20. The club head body 10 includes is made of stainless steel, titanium alloy, 20 carbon steel, low-alloy steel, cast iron, nickel-base alloy, structural steel, Fe-Mn-Al alloy, or super alloy. The club head body 10 includes an opening 11 in a front side thereof. A perimeter that delimits the opening 11 forms an inner

engaging face 12. Preferably, the inner engaging face 12 tapers rearward and may be a planar face or an arcuate face.

The striking plate 20 includes a front face (not labeled) for striking a golf ball (not shown). The striking plate 20 further includes an outer
5 perimeter that forms an outer engaging face 21. As illustrated in Fig. 2, a maximum width w_1 of a rear end portion of the outer engaging face 21 is larger than a maximum width w_2 of a rear end portion of the inner engaging face 12.

In assembly, as shown in Figs. 2 and 3, the striking plate 20 is placed
10 into the opening 11 of the club head body 10. Since the maximum width w_1 of the rear end portion of the outer engaging face 21 of the striking plate 20 is larger than the maximum width w_2 of the rear end portion of the inner engaging face 12 of the club head body 10, the outer engaging face 21 tightly abuts against the inner engaging face 12 at least at the rear end portion of the
15 outer engaging face 21, forming an abutting section B. Further, since the inner engaging face 12 tapers rearward, a filler-receiving space A is defined between the inner engaging face 12 and the outer engaging face 21.

The abutting section B allows the striking plate 20 to be reliably positioned in the opening 11 of the club head body 10 without the need of a
20 tool or the like. Positioning in the subsequent welding process is simplified. Further, during the welding process, in a heating procedure of a brazing process performed in a vacuum environment or in a high-temperature furnace

filled with inert gas, a sufficient amount of welding material 30 can be filled into the filler-receiving space A for engaging the inner engaging face 12 and the outer engaging face 21. The welding material 30 also flows inward (downward in Fig. 3) by capillary action to fill slits in the abutting section B.

5 The bonding reliability of the abutting section B is thus assured. In contrast, in the welding processes of U.S. Patent No. 5,871,408 and Taiwan Patent Publication No. 469144, the welding material flows upward by capillary action, which may not be able to completely fill the slits and thus fails to provide a reliable bonding effect. Accordingly, the combination of the striking plate

10 20 and the club head body 10 in accordance with the present invention provides improved welding effect, improved welding convenience, and improved bonding reliability.

Further, since the striking plate 20 and the club head body 10 are tightly engaged with each other due to provision of the inner engaging face 12

15 and the outer engaging face 21 in which the maximum width w_1 of the rear end portion of the outer engaging face 21 is larger than the maximum width w_2 of the rear end portion of the inner engaging face 12, a larger tolerance between the striking plate 20 and the opening 11 of the club head body 10 is provided. Namely, the precision requirement for the striking plate 20 and the

20 club head body 10 can be lowered. The manufacturing cost for the golf club head is cut, as milling of the striking plate 20 and the club head body 10 during manufacture of the striking plate 20 and the club head body 10 can be

eliminated or at least shorted, regardless of the manufacturing methods (such as precision casting, forging, pressing, or composite engaging of different materials) for manufacturing the striking plate 20 and the club head body 10.

Fig. 4 illustrates a second embodiment of the present invention,
5 wherein the outer engaging face 21 of the striking plate 20 tapers rearward. Nevertheless, the outer engaging face 21 extends in an inclining angle different from that of the inner engaging face 12. Again, the rear end portion of the outer engaging face 21 tightly abuts against the inner engaging face 12 to form an abutting section B, and a filler-receiving space A is formed
10 between the inner engaging face 12 and the outer engaging face 21. Positioning in the subsequent welding process is simplified. Improved welding effect, improved welding convenience, and improved bonding reliability are provided. Further, the outer engaging face 21 can be planar or arcuate.

15 Figs. 5 through 7 illustrate a third embodiment of the present invention modified from the first embodiment. In this embodiment, the outer perimeter of the striking plate 20 includes a first outer engaging face 21 on a rear end portion thereof and a second outer engaging face 21' on a front end portion thereof. Preferably, the first outer engaging face 21 tapers rearward
20 and extends in an inclining angle the same as that of the inner engaging face 12 of the club head body 10 such that the first outer engaging face 21 is in intimate contact with a portion of the inner engaging face 12 of the club head

body 10, forming an abutting section B. Further, a filler-receiving space A is formed between the second outer engaging face 21' of the striking plate 20 and the other portion of the inner engaging face 12 of the club head body 10, as the second outer engaging face 21' extends in a directing different from that of the inner engaging face 12 of the club head body 10. Positioning in the subsequent welding process is simplified. Improved welding effect, improved welding convenience, and improved bonding reliability are provided. Further, the club head body 10 may include a shoulder 13 extending from the rear end portion of the inner engaging face 12 along a plane orthogonal to an inserting direction for inserting the striking plate 20 into the opening 11 of the club head body 10. A rear face (not labeled) of the striking plate 20 is reliably supported by the shoulder 13, as shown in Fig. 7.

Figs. 8 through 10 illustrate a fourth embodiment of the present invention, wherein the inner perimeter delimiting the opening 11 of the club head body 10 includes a first inner engaging face 12 on a front end portion thereof and a second inner engaging face 12' on a rear end portion thereof. The first inner engaging face 12 and the second inner engaging face 12' taper rearward, with the first inner engaging face 12 extending in an inclining angle different from that of the second inner engaging face 12', and with the second inner engaging face 12' extending in an inclining angle the same as that of the outer engaging face 21. Thus, the second inner engaging face 12' of the club head body 10 is in intimate contact with the a rear end portion of the outer

engaging face 21 of the striking plate 20 to form an abutting section B. A filler-receiving space A is formed between a front end portion of the outer engaging face 21 of the striking plate 20 and the second inner engaging face 12' of the club head body 10. Positioning in the subsequent welding process is simplified. Improved welding effect, improved welding convenience, and improved bonding reliability are provided. Further, the club head body 10 may include a shoulder 13 extending from the rear end portion of the first inner engaging face 12 along a plane orthogonal to an inserting direction for inserting the striking plate 20 into the opening 11 of the club head body 10. A rear face (not labeled) of the striking plate 20 is reliably supported by the shoulder 13, as shown in Fig. 10.

Figs. 11 and 12 illustrate a fifth embodiment of the present invention, wherein the outer engaging face 21 of the striking plate 20 includes a cutout 22 in a front end portion thereof. Preferably, the cutout 22 extends along the perimeter of the striking plate 20. Further, the outer engaging face 21 extends in an inclining angle the same as that of the inner engaging face 12 of the club head body 10. Thus, when the striking plate 20 is mounted in the opening 11 of the club head body 10, the cutout 22 of the striking plate 20 forms a filler receiving space A for receiving a sufficient amount of welding material 30. Further, the outer engaging face 21 of the striking plate 20 and the inner engaging face 12 of the club head body 10 together form an abutting section B. Positioning in the subsequent welding process is simplified. Improved

welding effect, improved welding convenience, and improved bonding reliability are provided.

Figs. 13 and 14 illustrate a sixth embodiment of the present invention, wherein the inner engaging face 12 of the club head body 10 includes a cutout 14 in a front end portion thereof. Preferably, the cutout 14 extends along the perimeter delimiting the opening 11 of the club head body 10. Further, the outer engaging face 21 extends in an inclining angle the same as that of the inner engaging face 12 of the club head body 10. Thus, when the striking plate 20 is mounted in the opening 11 of the club head body 10, the cutout 14 of the club head body 10 forms a filler receiving space A for receiving a sufficient amount of welding material 30. Further, the outer engaging face 21 of the striking plate 20 and the inner engaging face 12 of the club head body 10 together form an abutting section B. Positioning in the subsequent welding process is simplified. Improved welding effect, improved welding convenience, and improved bonding reliability are provided.

While the principles of this invention have been disclosed in connection with specific embodiments, it should be understood by those skilled in the art that these descriptions are not intended to limit the scope of the invention, and that any modification and variation without departing the spirit of the invention is intended to be covered by the scope of this invention defined only by the appended claims.